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Roundtree

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(54) **IMPACT-ABSORBING HELMET**

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(58) **Field of Classification Search**

None

See application file for complete search history.

(56) **References Cited**

U.S. PATENT DOCUMENTS

986,686 A 3/1911 Carney
2,867,811 A * 1/1959 Jones A42B 3/08
2,950,576 A * 8/1960 Rubenstein E04B 1/383
3,327,316 A * 6/1967 Pukish, Jr. A63B 71/10
2/421

3,619,813 A * 11/1971 Marchello A42B 3/08
2/421
3,916,446 A * 11/1975 Gooding A42B 3/08
2/421
4,051,556 A * 10/1977 Davenport A42B 3/08
2/421
4,330,103 A * 5/1982 Thuries H02B 1/54
248/548
4,651,356 A * 3/1987 Zide A42B 3/08
2/421
4,741,054 A * 5/1988 Mattes A42B 3/08
2/421
4,741,516 A * 5/1988 Davis B60G 17/04
267/64.13
5,204,998 A * 4/1993 Liu F16F 1/3732
2/411
5,347,660 A * 9/1994 Zide A42B 3/08
2/421
5,371,905 A * 12/1994 Keim A42B 3/0473
2/413
5,685,020 A * 11/1997 Powell A42B 3/08
2/421

(Continued)

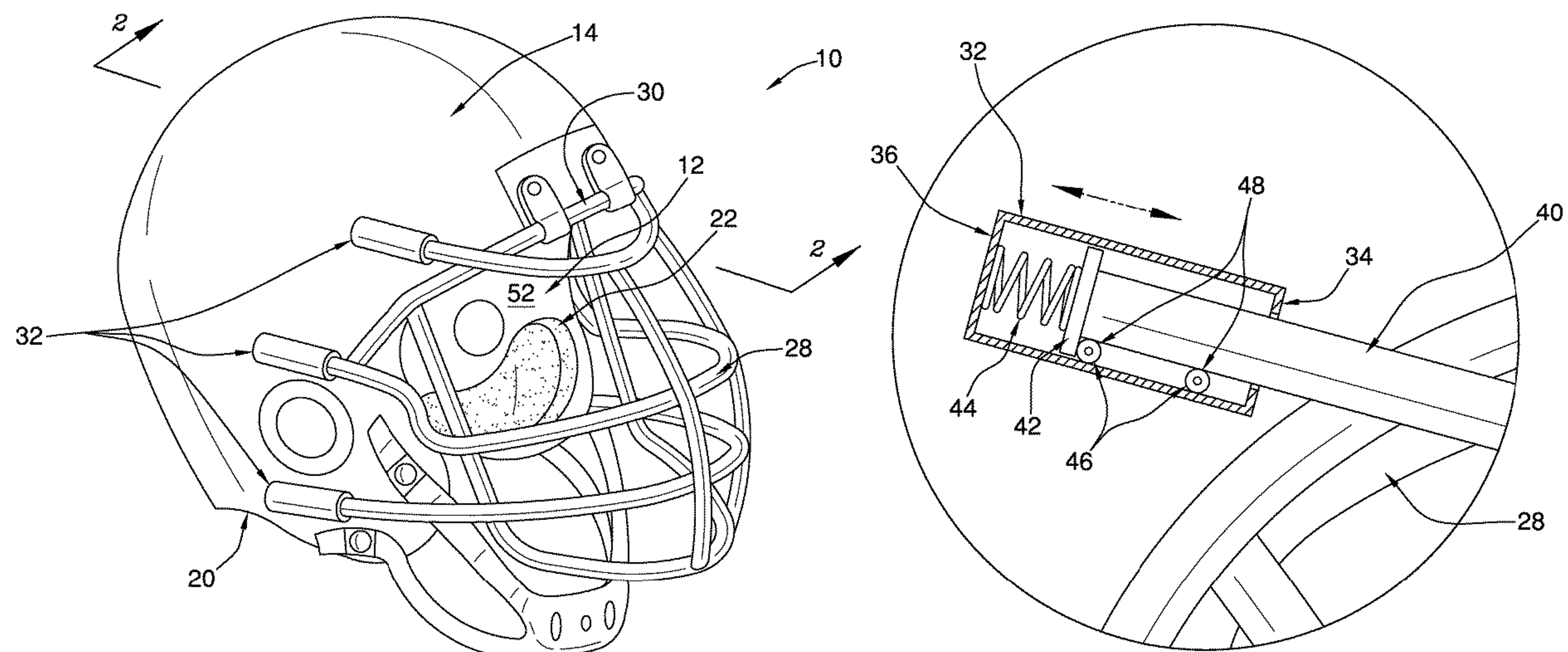
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(57)

ABSTRACT

An impact-absorbing helmet for reducing brain trauma includes an inner shell and an outer shell. The inner shell has a bottom and a front that are open. The bottom is configured to insert a head of a user, positioning the front proximate to a face of the user. The outer shell is complementary to and positioned around the inner shell. The outer shell has an edge that is coupled to a rim of the inner shell so that the inner shell and the outer shell define an interior space. A plurality of first springs is positioned in the interior space. Each first spring is coupled to and extends between the inner shell and the outer shell. The first springs are configured to reduce transfer to the inner shell of a force applied to the outer shell.

13 Claims, 6 Drawing Sheets



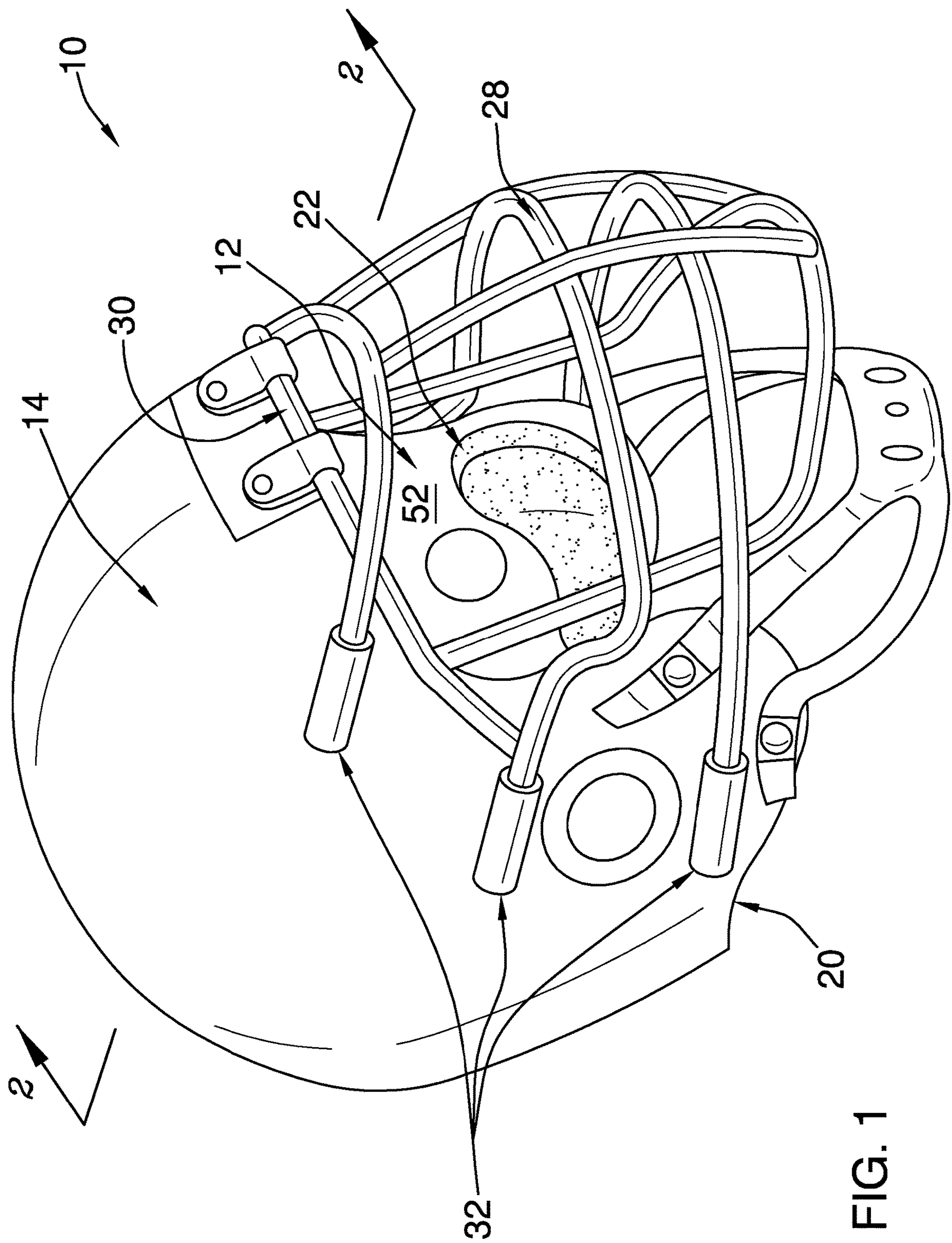
(56)

References Cited

U.S. PATENT DOCUMENTS

5,946,735	A *	9/1999	Bayes	A42B 3/08 2/421
5,956,777	A *	9/1999	Popovich	A42B 3/20 2/412
6,081,932	A *	7/2000	Kraemer	A42B 3/08 2/421
6,298,483	B1 *	10/2001	Schiebl	A42B 3/0433 2/421
6,481,024	B1 *	11/2002	Grant	A42B 3/08 2/421
6,854,133	B2 *	2/2005	Lee	A42B 3/063 2/412
6,934,971	B2 *	8/2005	Ide	A42B 3/08 2/425
7,036,151	B2 *	5/2006	Ide	A42B 3/08 2/9
7,152,253	B2 *	12/2006	Abelman	A42B 3/08 2/421
7,328,462	B1 *	2/2008	Straus	A42B 3/067 2/411
7,607,179	B2 *	10/2009	Shih	A42B 3/20 2/411
8,899,562	B1 *	12/2014	Staton	G08B 21/18 267/140.13
8,959,668	B1 *	2/2015	Ganes	A42B 3/205 2/421
9,032,558	B2 *	5/2015	Leon	A42B 3/08 2/411
9,314,060	B2 *	4/2016	Giles	A42B 3/00
9,388,873	B1 *	7/2016	Phipps	A47C 27/06
9,476,478	B2 *	10/2016	Staton	A42B 3/063
9,630,671	B1 *	4/2017	Sze	A42B 3/006
9,648,920	B1 *	5/2017	Kuntz	A42B 3/20
9,756,889	B2 *	9/2017	Infusino	A42B 3/08
D803,483	S	11/2017	Bologna	
9,949,523	B2 *	4/2018	Klein	A42B 3/20
10,010,126	B1 *	7/2018	Shaffer	A42B 3/283
10,029,633	B2 *	7/2018	Phipps	B60N 2/42
10,092,054	B2 *	10/2018	Williams	A42B 3/063
10,092,057	B2 *	10/2018	Kovarik	A42B 3/20
10,292,447	B2 *	5/2019	Connelly	A42B 3/08
10,315,095	B1 *	6/2019	Sneed	A63B 71/10
10,495,174	B1 *	12/2019	Staton	A63B 71/10
10,694,803	B2 *	6/2020	Neal	A42B 3/20
10,716,352	B2 *	7/2020	Knight	A41D 13/015
2004/0003452	A1 *	1/2004	Schiebl	A42B 3/08 2/421
2004/0026196	A1 *	2/2004	Huisman	B60G 3/01 188/322.16
2004/0040073	A1 *	3/2004	Morrow	A42B 3/205 2/424
2004/0168246	A1 *	9/2004	Phillips	A42B 3/064 2/411
2006/0059605	A1 *	3/2006	Ferrara	A42B 3/064 2/410
2006/0191403	A1 *	8/2006	Hawkins	F41H 5/04 89/36.05
2007/0151003	A1 *	7/2007	Shih	A42B 3/20 2/424
2008/0163410	A1 *	7/2008	Udelhofen	A42B 3/20 2/413
2008/0313791	A1 *	12/2008	Nagely	A42B 3/0473 2/425
2009/0077703	A1 *	3/2009	Gabry	A41D 13/05 2/16
2012/0036620	A1 *	2/2012	Harris	A42B 3/127 2/414
2013/0061371	A1 *	3/2013	Phipps	A42B 3/064 2/411
2013/0185837	A1 *	7/2013	Phipps	A42B 3/20 2/2.5
2013/0285300	A1 *	10/2013	Shimasaki	B60G 15/061 267/221
2013/0298316	A1 *	11/2013	Jacob	A42B 3/125 2/414
2014/0000012	A1 *	1/2014	Mustapha	A42B 3/064 2/414
2014/0068840	A1 *	3/2014	Nauman	A61G 5/1045 2/411
2014/0123371	A1 *	5/2014	Witcher	A42B 3/121 2/413
2014/0208486	A1 *	7/2014	Krueger	A42B 3/064 2/414
2014/0223646	A1 *	8/2014	Bologna	A42B 3/326 2/424
2015/0089722	A1 *	4/2015	Berry	A42B 3/064 2/412
2015/0135413	A1 *	5/2015	Mayerovitch	A42B 3/125 2/414
2015/0150330	A1 *	6/2015	Andrews	A42B 3/127 2/414
2015/0164172	A1 *	6/2015	Linares	A42B 3/0473 2/411
2015/0201695	A1 *	7/2015	Shih	A42B 3/226 2/9
2016/0029730	A1 *	2/2016	Day	F16F 3/0873 2/412
2016/0029733	A1 *	2/2016	Kovarik	A63B 71/10 2/411
2016/0040743	A1 *	2/2016	Staton	F41C 23/06 2/412
2016/0088884	A1 *	3/2016	Guerra	A42B 3/124 2/411
2016/0255900	A1 *	9/2016	Browd	A42B 3/121
2016/0287447	A1 *	10/2016	Mooradd	A61L 15/44
2017/0112220	A1 *	4/2017	Suddaby	A42B 3/0453
2017/0119080	A1 *	5/2017	Allen	A42B 3/28
2017/0232327	A1 *	8/2017	Kuntz	A42B 3/125 2/413
2017/0303622	A1 *	10/2017	Stone	A42B 3/064
2018/0206583	A1 *	7/2018	Neal	A42B 3/20
2018/0220730	A1 *	8/2018	Sicking	A42B 3/08
2018/0228239	A1 *	8/2018	Day	A42B 3/064
2019/0059498	A1 *	2/2019	Kovarik	A42B 3/20
2019/0216155	A1 *	7/2019	Zents	A42B 3/08
2019/0216159	A1 *	7/2019	Vanhoutin	A42B 3/128
2019/0307201	A1 *	10/2019	Neal	A42B 3/06

* cited by examiner



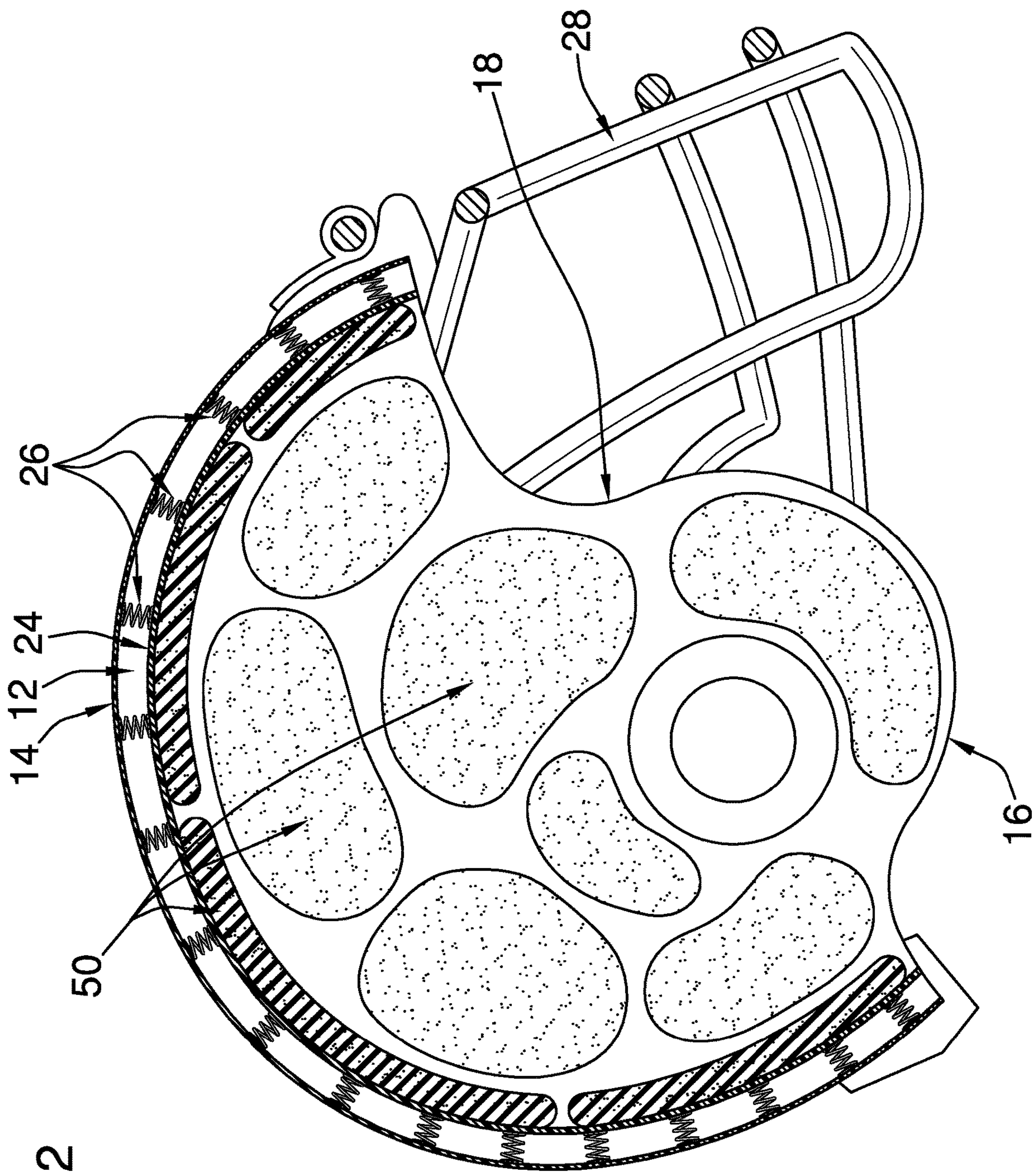


FIG. 2

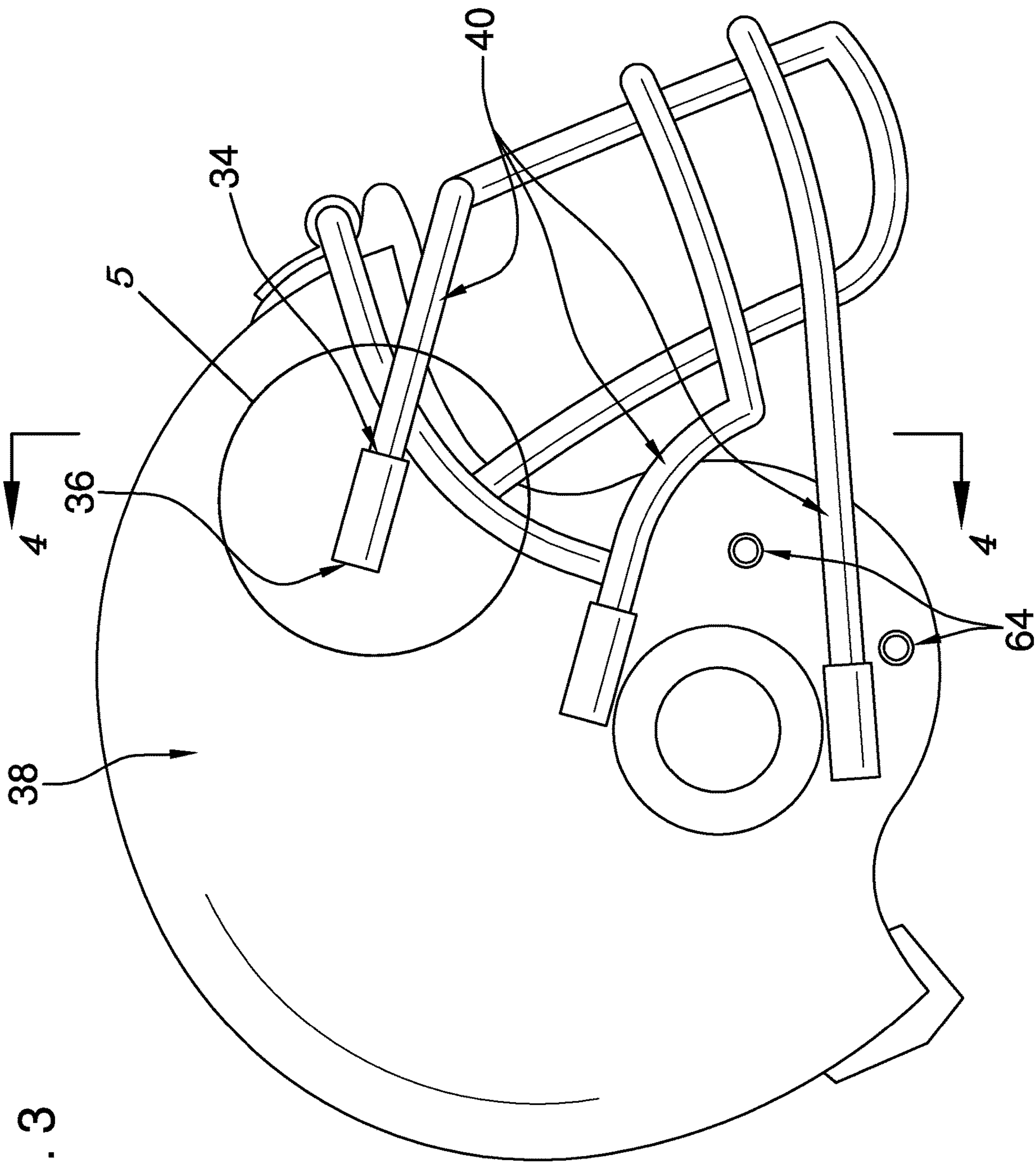


FIG. 3

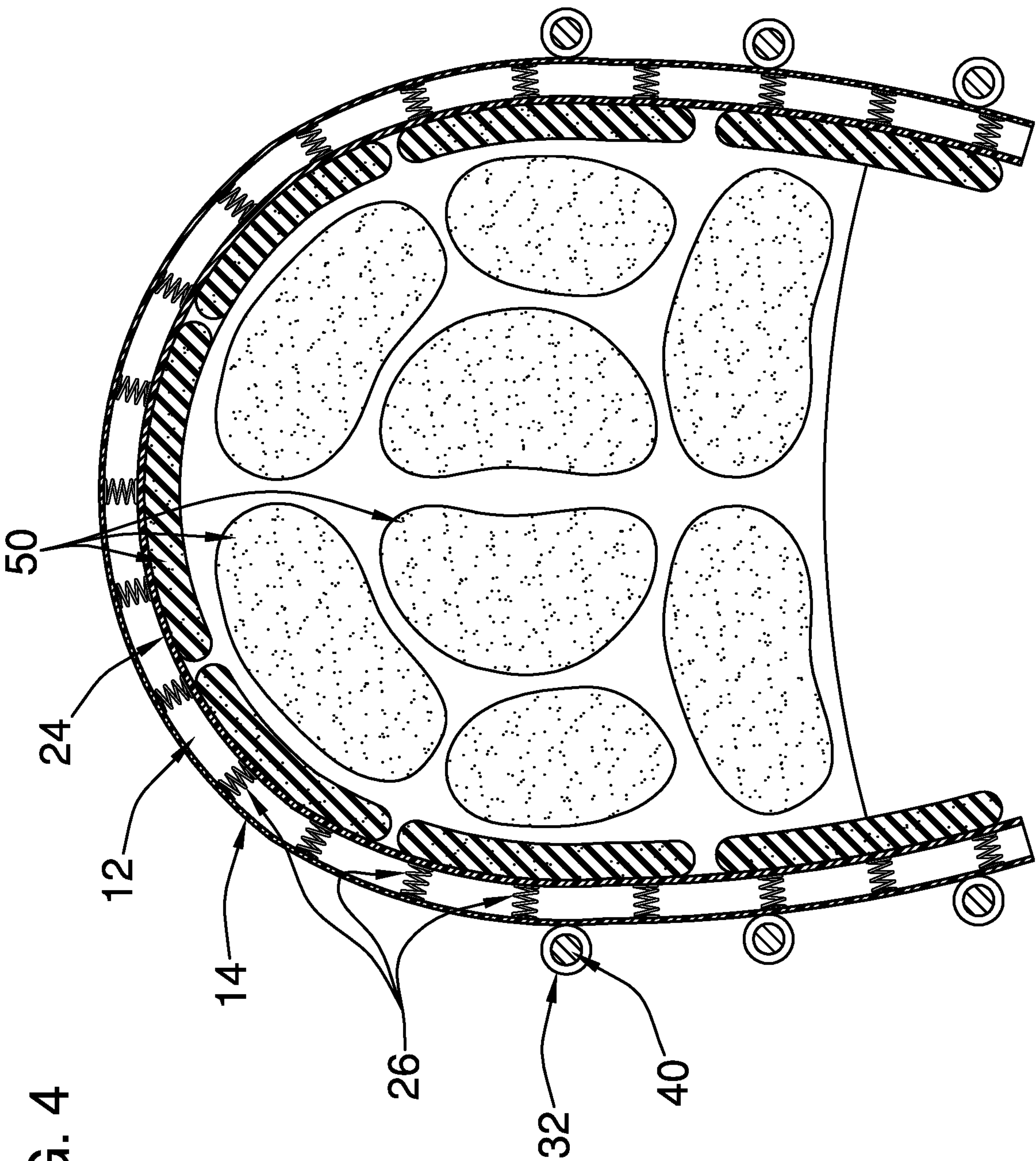


FIG. 4

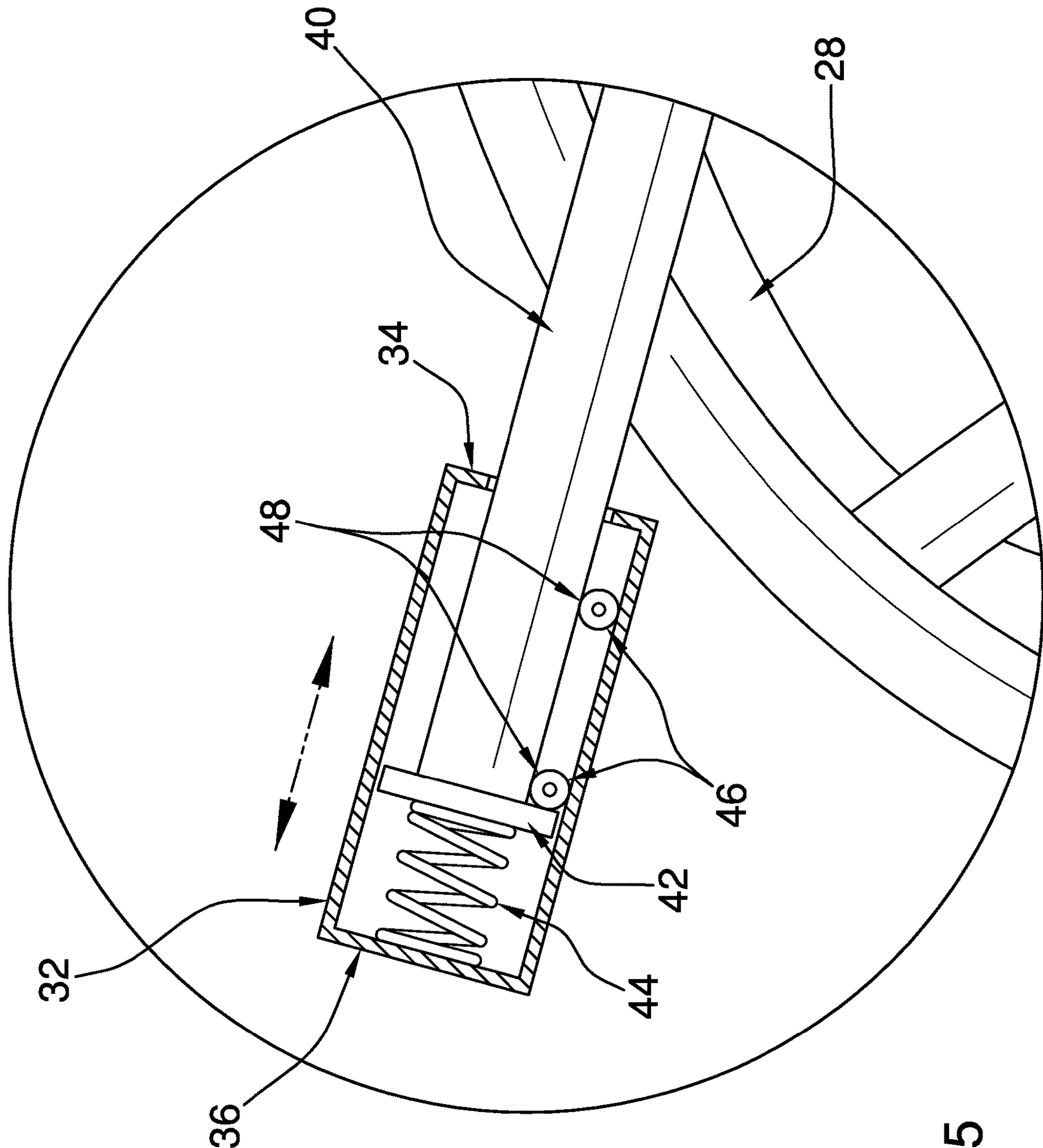
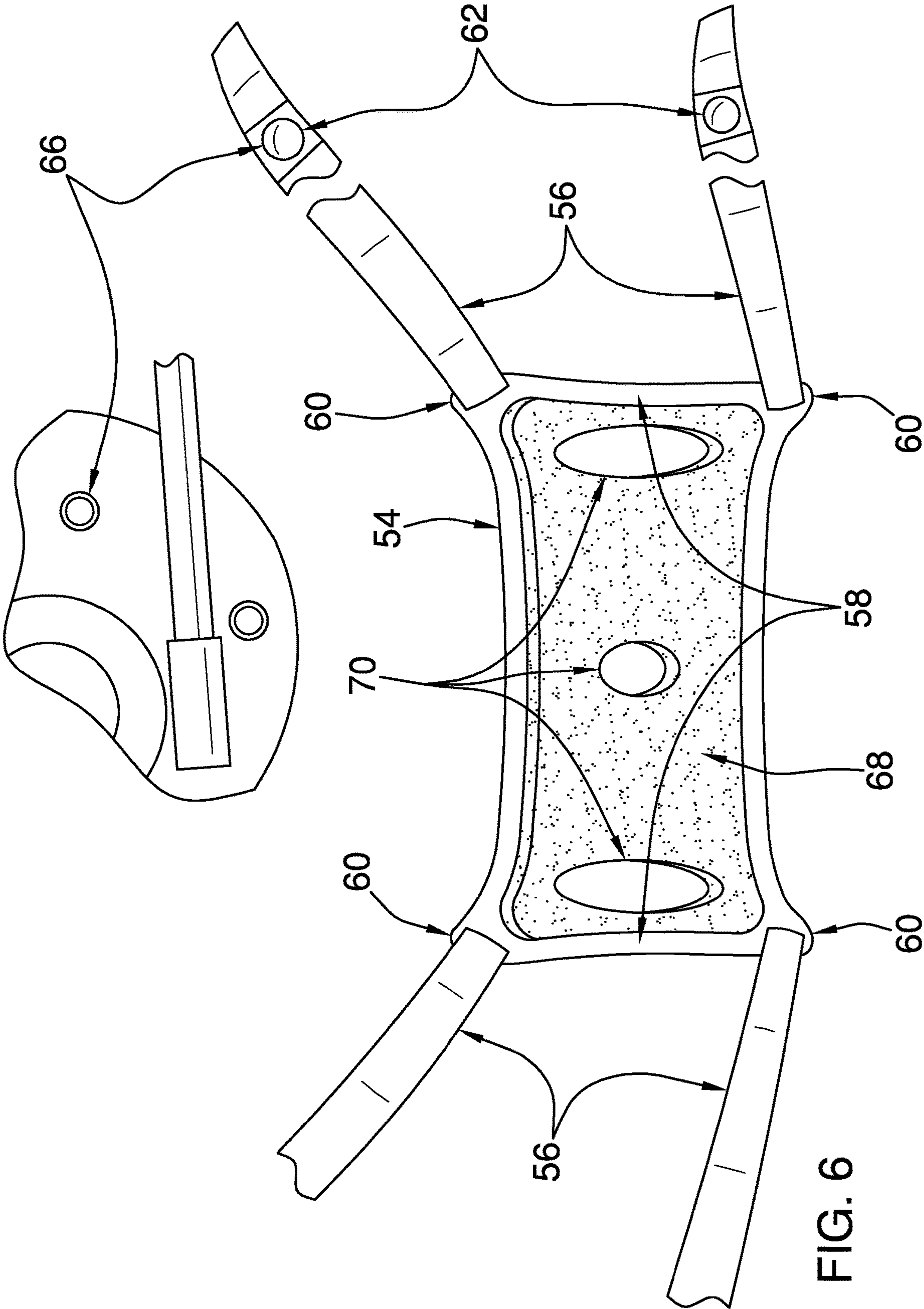


FIG. 5



1**IMPACT-ABSORBING HELMET****CROSS-REFERENCE TO RELATED APPLICATIONS**

Not Applicable

STATEMENT REGARDING FEDERALLY SPONSORED RESEARCH OR DEVELOPMENT

Not Applicable

THE NAMES OF THE PARTIES TO A JOINT RESEARCH AGREEMENT

Not Applicable

INCORPORATION-BY-REFERENCE OF MATERIAL SUBMITTED ON A COMPACT DISC OR AS A TEXT FILE VIA THE OFFICE ELECTRONIC FILING SYSTEM

Not Applicable

STATEMENT REGARDING PRIOR DISCLOSURES BY THE INVENTOR OR JOINT INVENTOR

Not Applicable

BACKGROUND OF THE INVENTION**(1) Field of the Invention****(2) Description of Related Art Including Information Disclosed Under 37 CFR 1.97 and 1.98**

The disclosure and prior art relates to helmets and more particularly pertains to a new helmet for reducing brain trauma.

BRIEF SUMMARY OF THE INVENTION

An embodiment of the disclosure meets the needs presented above by generally comprising an inner shell and an outer shell. The inner shell has a bottom and a front that are open. The bottom is configured to insert a head of a user, positioning the front proximate to a face of the user. The outer shell is complementary to and positioned around the inner shell. The outer shell has an edge that is coupled to a rim of the inner shell so that the inner shell and the outer shell define an interior space. A plurality of first springs is positioned in the interior space. Each first spring is coupled to and extends between the inner shell and the outer shell. The first springs are configured to reduce transfer to the inner shell of a force applied to the outer shell.

There has thus been outlined, rather broadly, the more important features of the disclosure in order that the detailed description thereof that follows may be better understood, and in order that the present contribution to the art may be better appreciated. There are additional features of the disclosure that will be described hereinafter and which will form the subject matter of the claims appended hereto.

The objects of the disclosure, along with the various features of novelty which characterize the disclosure, are

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pointed out with particularity in the claims annexed to and forming a part of this disclosure.

BRIEF DESCRIPTION OF SEVERAL VIEWS OF THE DRAWING(S)

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The disclosure will be better understood and objects other than those set forth above will become apparent when consideration is given to the following detailed description thereof. Such description makes reference to the annexed drawings wherein:

FIG. 1 is an isometric perspective view of an impact-absorbing helmet according to an embodiment of the disclosure.

FIG. 2 is a cross-sectional view of an embodiment of the disclosure.

FIG. 3 is a side view of an embodiment of the disclosure.

FIG. 4 is a cross-sectional view of an embodiment of the disclosure.

FIG. 5 is a detail view of an embodiment of the disclosure.

FIG. 6 is an isometric perspective view of an embodiment of the disclosure.

DETAILED DESCRIPTION OF THE INVENTION

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With reference now to the drawings, and in particular to FIGS. 1 through 6 thereof, a new helmet embodying the principles and concepts of an embodiment of the disclosure and generally designated by the reference numeral 10 will be described.

As best illustrated in FIGS. 1 through 6, the impact-absorbing helmet 10 generally comprises an inner shell 12 and an outer shell 14. The inner shell 12 has a bottom 16 and a front 18 that are open. The bottom 16 is configured to insert a head of a user, positioning the front 18 proximate to a face of the user.

The outer shell 14 is complementary to and positioned around the inner shell 12. The outer shell 14 has an edge 20 that is coupled to a rim 22 of the inner shell 12 so that the inner shell 12 and the outer shell 14 define an interior space 24. The outer shell 14 and the inner shell 12 comprise thermoplastic polymer so that the outer shell 14 and the inner shell 12 are resiliently deformable.

A plurality of first springs 26 is positioned in the interior space 24, as shown in FIGS. 2 and 4. Each first spring 26 is coupled to and extends between the inner shell 12 and the outer shell 14. The first springs 26 are configured to reduce transfer to the inner shell 12 of a force that is applied to the outer shell 14.

A grate 28 is pivotally coupled by an upper end 30 to the outer shell 14 so that the grate 28 is positioned to cover the front 18 of the inner shell 12, as shown in FIG. 1. The grate 28 is configured to protect the face of the user.

A plurality of cylinders 32 is coupled to the outer shell 14 so that a first end 34 of each cylinder 32 is positioned proximate to the front 18. The first end 34 is open. Each cylinder 32 has a second end 36 that is closed. The plurality of cylinders 32 comprises six cylinders 32 that are positioned three-apiece on opposing sides 38 of the outer shell 14, as shown in FIG. 4.

A plurality of rods 40 is coupled to the grate 28. Each rod 40 extends into an associated cylinder 32. The rod 40 is circumferentially smaller than the associated cylinder 32. Each of a plurality of plates 42 is coupled to a respective rod 40 distal from the grate 28. The plate 42 is circumferentially complementary to the associated cylinder 32.

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Each of a plurality of second springs **44** is coupled to and extends between the second end **36** of a respective cylinder **32** and an associated plate **42**. The second spring **44** is positioned to be tensioned as the plate **42** is urged toward the second end **36** of the respective cylinder **32** by a force that is applied to the grate **28** to reduce transfer to the outer shell **14** of the force that is applied to the grate **28**. The second spring **44** is configured to rebound to urge the rod **40** distally from the second end **36** of the respective cylinder **32** when the force is removed from the grate **28**.

Each of a plurality of bearings **46** is coupled to and positioned in a respective cylinder **32**. The bearing **46** is positioned to facilitate movement of an associated rod **40** within the respective cylinder **32**. Each bearing **46** comprises a plurality of wheels **48**.

Each of a plurality of first pads **50** is coupled to an outer surface **52** of the inner shell **12**, as shown in FIGS. **2** and **4**, so that the plurality of first pads **50** abuts the head of the user. The first pads **50** are configured to reduce transfer to the head of the user of a force that is applied to inner shell **12**. The first pads **50** comprises silicone.

The helmet **10** also comprises a panel **54** that is substantially rectangularly shaped and which comprises leather. Each of a plurality of straps **56** is coupled to and extends from a respective opposing end **58** of the panel **54**. The plurality of straps **56** comprises four straps **56** that are coupled singly proximate to each corner **60** of the panel **54**.

Each of a plurality of first couplers **62** is coupled to a respective strap **56** distal from the panel **54**. Each of a plurality of second couplers **64** is coupled to the outer shell **14** proximate to the front **18** of the inner shell **12**. The second couplers **64** are complementary to the first couplers **62**. Each second coupler **64** is positioned to selectively couple to a respective first coupler **62** so that the panel **54** is positioned over a chin of the user. The plurality of straps **56** is configured to couple the outer shell **14** to the head of the user. The second coupler **64** and the respective first coupler **62** comprise a snap closure **66**.

A second pad **68** is coupled to the panel **54** so that the second pad **68** is positioned between the panel **54** and the chin of the user. The second pad **68** is positioned to cushion the panel **54**. The second pad **68** comprises silicone. Each of a plurality of apertures **70** extends through the panel **54** and the second pad **68**. The plurality of apertures **70** is configured to allow air exchange across the panel **54** and the second pad **68**.

In use, the user dons the helmet **10** and secures it to his or her head with the straps **56** using the snap closures **66**. The first springs **26**, the second springs **44**, and the first pads **50** are configured to reduce the force that is transferred to the head of impacts to the helmet **10**, which reduces trauma to the brain of the user.

With respect to the above description then, it is to be realized that the optimum dimensional relationships for the parts of an embodiment enabled by the disclosure, to include variations in size, materials, shape, form, function and manner of operation, assembly and use, are deemed readily apparent and obvious to one skilled in the art, and all equivalent relationships to those illustrated in the drawings and described in the specification are intended to be encompassed by an embodiment of the disclosure.

Therefore, the foregoing is considered as illustrative only of the principles of the disclosure. Further, since numerous modifications and changes will readily occur to those skilled in the art, it is not desired to limit the disclosure to the exact construction and operation shown and described, and accordingly, all suitable modifications and equivalents may

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be resorted to, falling within the scope of the disclosure. In this patent document, the word “comprising” is used in its non-limiting sense to mean that items following the word are included, but items not specifically mentioned are not excluded. A reference to an element by the indefinite article “a” does not exclude the possibility that more than one of the element is present, unless the context clearly requires that there be only one of the elements.

I claim:

1. An impact-absorbing helmet comprising:

an inner shell, the inner shell having a bottom and a front, the bottom and the front being open; wherein the bottom is configured for receiving a head of a user and the front is configured to be positioned proximate to a face of the user;

an outer shell complementary to the inner shell and positioned around the inner shell, the outer shell having an edge coupled to a rim of the inner shell such that the inner shell and the outer shell define an interior space; a plurality of first springs positioned in the interior space, each first spring being coupled to, and extending between, the inner shell and the outer shell, wherein the first springs are configured for reducing transfer to the inner shell of a force applied to the outer shell;

a grate pivotally coupled at an upper end of the grate to the outer shell such that the grate is positioned for covering the front of the inner shell, wherein the grate is configured for protecting the face of the user;

a plurality of cylinders coupled to the outer shell, each cylinder having an open first end and a closed second end, wherein the first end of each cylinder is positioned proximate to the front;

a plurality of rods coupled to the grate, each rod extending into a respective cylinder of the plurality of cylinders, each rod being circumferentially smaller than the respective cylinder;

a plurality of plates, each plate being coupled to a distal end of a respective rod of the plurality of rods, each plate being circumferentially complementary to the respective cylinder;

a plurality of second springs, each second spring being coupled to, and extending between, the closed second end of a respective cylinder of the plurality of cylinders and a respective plate of the plurality of plates, wherein each second spring is positioned for tensioning as the respective plate is urged toward the closed second end of the respective cylinder by a force applied to the grate, for reducing transfer to the outer shell of the force applied to the grate, and wherein each second spring is configured for rebounding for urging the respective plate away from the closed second end of the respective cylinder when the force is removed from the grate; and

a plurality of bearings, each bearing being coupled to and positioned in a respective cylinder of the plurality of cylinders, wherein each bearing is positioned for facilitating movement of the respective rod within the respective cylinder, each bearing comprising a plurality of wheels.

2. The helmet of claim 1, further including wherein the outer shell and the inner shell comprise thermoplastic polymer such that the outer shell and the inner shell are resiliently deformable.

3. The helmet of claim 1, wherein the plurality of cylinders comprise six cylinders positioned three-apiece on opposing sides of the outer shell.

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4. The helmet of claim 1, further including a plurality of first pads coupled to an inner surface of the inner shell such that the plurality of first pads is configured to abut the head of the user, and wherein the first pads are configured for reducing transfer to the head of the user of a force applied to the inner shell.

5. The helmet of claim 4, wherein the first pads comprise silicone.

6. The helmet of claim 1, further comprising:

- a panel;
- a plurality of straps, each strap being coupled to and extending from a respective opposing end of the panel;
- a plurality of first couplers, each first coupler being coupled to a distal portion of a respective strap of the plurality of straps;
- a plurality of second couplers coupled to the outer shell proximate to the front of the inner shell, the second couplers being complementary to the first couplers, wherein each second coupler is positioned for selectively coupling to a respective first coupler of the plurality of first couplers, such that the panel is configured to be positioned over a chin of the user, and wherein the plurality of straps is configured for coupling the outer shell to the head of the user; and
- a second pad coupled to the panel such that the second pad is configured to be positioned between the panel and the chin of the user wherein the second pad is positioned for cushioning the panel.

7. The helmet of claim 6, wherein the panel is substantially rectangularly shaped.

8. The helmet of claim 7, wherein the panel comprises leather.

9. The helmet of claim 7, wherein the panel comprises corners, the plurality of straps comprising four straps coupled singly proximate to each corner of the panel.

10. The helmet of claim 7, wherein each second coupler and each first coupler comprises a snap closure.

11. The helmet of claim 7, wherein the second pad comprises silicone.

12. The helmet of claim 7, further including a plurality of apertures, each aperture extending through the panel and the second pad, wherein the plurality of apertures is configured for air exchange across the panel and the second pad.

13. An impact-absorbing helmet comprising:

- an inner shell, the inner shell having a bottom and a front, the bottom and the front being open; wherein the bottom is configured for receiving a head of a user and the front is configured to be positioned positioning the front proximate to a face of the user;
- an outer shell complementary to the inner shell and positioned around the inner shell, the outer shell having an edge coupled to a rim of the inner shell such that the inner shell and the outer shell define an interior space, the outer shell and the inner shell comprising thermoplastic polymer such that the outer shell and the inner shell are resiliently deformable;
- a plurality of first springs positioned in the interior space, each first spring being coupled to, and extending between, the inner shell and the outer shell, wherein the first springs are configured for reducing transfer to the inner shell of a force applied to the outer shell;
- a grate pivotally coupled at an upper end of the grate to the outer shell such that the grate is positioned for covering the front of the inner shell, wherein the grate is configured for protecting the face of the user;
- a plurality of cylinders coupled to the outer shell, each cylinder having an open first end and a closed second

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end, wherein the first end of each cylinder is positioned proximate to the front, the plurality of cylinders comprising six cylinders positioned three-apiece on opposing sides of the outer shell;

- a plurality of rods coupled to the grate, each rod extending into a respective cylinder of the plurality of cylinders, each rod being circumferentially smaller than the respective cylinder;
- a plurality of plates, each plate being coupled to a distal end of a respective rod of the plurality of rods, each plate being circumferentially complementary to the respective cylinder;
- a plurality of second springs, each second spring being coupled to, and extending between, the closed second end of a respective cylinder of the plurality of cylinders and a respective plate of the plurality of plates, wherein each second spring is positioned for tensioning as the respective plate is urged toward the closed second end of the respective cylinder by a force applied to the grate, for reducing transfer to the outer shell of the force applied to the grate, and wherein each second spring is configured for rebounding for urging the respective plate away from the closed second end of the respective cylinder when the force is removed from the grate;
- a plurality of bearings, each bearing being coupled to and positioned in a respective cylinder of the plurality of cylinders, wherein each bearing is positioned for facilitating movement of the respective rod within the respective cylinder, each bearing comprising a plurality of wheels;
- a plurality of first pads coupled to an inner surface of the inner shell such that the plurality of first pads are configured to abut the head of the user, wherein the first pads are configured for reducing transfer to the head of the user of a force applied to the inner shell, the first pads comprising silicone;
- a panel, the panel being substantially rectangularly shaped and having corners, the panel comprising leather;
- a plurality of straps, each strap being coupled to and extending from a respective opposing end of the panel, the plurality of straps comprising four straps coupled singly proximate to each corner of the panel;
- a plurality of first couplers, each first coupler being coupled to a distal portion of a respective strap of the plurality of straps;
- a plurality of second couplers coupled to the outer shell proximate to the front of the inner shell, the second couplers being complementary to the first couplers, wherein each second coupler is positioned for selectively coupling to a respective first coupler of the plurality of first couplers, such that the panel is configured to be positioned over a chin of the user, and wherein the plurality of straps is configured for coupling the outer shell to the head of the user, each second coupler and each first coupler comprising a snap closure;
- a second pad coupled to the panel such that the second pad is configured to be positioned between the panel and the chin of the user, wherein the second pad is positioned for cushioning the panel, the second pad comprising silicone; and
- a plurality of apertures, each aperture extending through the panel and the second pad, wherein the plurality of apertures is configured for air exchange across the panel and the second pad.